

Half Yearly Examination-2020-21

B.C.A. Part-II

CALCULUS AND DIFFERENTIAL EQUATION

[Time- 3 hours]

[Maximum Marks : 80]

Note: Attempt any two parts from each question, All questions carry equal marks.

1.(a) Show that the function

$$F(x) = (3x^2 + 2x + 1) \text{ is continuous at } x=2$$

(b) Test for differentiability of the function

$$F(x) = \begin{cases} x^2 \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

(c) Evaluate $\lim_{x \rightarrow 0} \frac{8^x - 2^x}{x}$ at $x = 0$

2.(a) If $x = e^{\cos 2t}$ and $y = e^{\sin 2t}$, prove that

$$\frac{dy}{dx} = \frac{y \log x}{x \log y}$$

(b) if $y = \log(\cos x^2)$ then find $\frac{dy}{dx}$.

(c) if $x = a(t + \sin t)$, $y = a(1 - \cos t)$ then find dy/dx .

3.(a) Evaluate: $\int \frac{x-1}{(x-2)(x-3)} dx$

(b) Evaluate: $\int \sin^7 x dx$.

(c) Evaluate: $\int \frac{dx}{5+4\cos x}$.

4(a) Evaluate: $\int_0^{\pi} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx = \frac{\pi}{4}$.

(b) Evaluate: $\int \sqrt{\cot \theta} d\theta$.

(c) Evaluate: $[\sqrt{\tan x} + \sqrt{\cot x}] dx$

5(a) Form the differential equation from $y = Ae^{2x} + Be^x + C$. where A,B,C are constant.

(b) solve $\frac{dy}{dx} = \frac{x+y}{x-y}$.

(c) solve $(1-x^2) \frac{dy}{dx} + 2xy = x\sqrt{1-x^2}$.

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